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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Concrete Panel Construction

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(73) Same as inventor

(57) 7 Claims

Notice: The specification contained herein as filed

Canada

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ABSTRACT OF THE DISCLOSURE

Thin concrete building panels with metal hangers embedded in the rear surface thereof are mass produced in a form by placing the hangers on dowels in ledges on each side of cavities in the form, pouring concrete into a transfer dispenser which includes open ended spouts equal in volume to the volume of a fold cavity, placing the dispenser on the dowels, and vibrating the dispenser and form to cause the concrete to flow into and settle evenly in the cavity, and to eliminate air pockets in the concrete.

This invention relates to a method and apparatus for producing building panels, and in particular concrete panels for exterior use on buildings.

Thin panels of the type produced in accordance with the present invention are used to simulate natural stones. Because the panels are relatively thin, the cost of producing a simulated stone finish is substantially less expensive than when using natural or real stones. Panels of the type described herein are typically produced in separate molds which is both time consuming and expensive.

The object of the present invention is to solve the above mentioned problem by providing a relatively simple, efficient method and apparatus for producing concrete panels.

Accordingly, the invention relates to a method of producing a concrete building panel of the type including a thin concrete body and metal hangers embedded in the body for mounting the panel, said method comprising the steps of:

- (a) placing hangers for the panel on a form;
- (b) loading a transfer dispenser with sufficient concrete to fill the form;
- (c) placing the transfer dispenser over the form;
- (d) vibrating the transfer dispenser to release the concrete into the form; and
- (e) vibrating the form to settle the concrete in the form.

The invention also relates to an apparatus for producing a concrete building panel of the type including a thin, concrete body and metal hangers embedded in the body for mounting the panel, said apparatus comprising:

- 5 (a) thin plastic form means defining a cavity including bottom wall means, side wall means and an open top for receiving concrete;
- (b) dowel means on said side wall means for supporting said metal hangers in the open top of the
10 form;
- (c) transfer dispenser means for receiving and dispensing a predetermined volume of concrete into said form means; and
- (d) vibrator means for vibrating said transfer
15 dispenser means to cause concrete to flow from the dispenser means into the cavity of said form means, and for vibrating said form means to distribute concrete even in the cavity and to eliminate air pockets in the concrete.

20 The invention will be described in greater detail with reference to the accompanying drawings, which illustrate a preferred embodiment of the invention, and wherein:

Figure 1 is a front view of a concrete panel produced using the method and apparatus of the present
25 invention;

Figure 2 is a side view of the panel of Fig. 1;

Figure 3 is a rear view of the panel of Fig. 2;

Figure 4 is a perspective view from below and one end of a hanger used in the panel of Figs. 1 to 3;

Figure 5 is a bottom view of the hanger of Fig. 4;

5 Figure 6 is a top view of the hanger of Fig. 4;

Figure 7 is an end view of the hanger of Figs. 4 and 5 as seen from the left of Fig. 5;

Figure 8 is an end view of the hanger of Figs. 4 and 5 as seen from the right of Fig. 5;

10 Figure 9 is an exploded, perspective view of a section of a concrete form and a transfer dispenser in accordance with the present invention;

Figure 10 is a perspective view of a dowel used on the form of Fig. 9;

15 Figure 11 is a perspective view of an area of the form of Fig. 10 filled with concrete; and

Figure 12 is a cross section of the dowel and form shown in Fig. 11.

Referring to Figs. 1 to 3, the method and apparatus
20 of the present invention are designed to produce a concrete panel generally indicated at 1. The panel includes a thin rectangular body 2, typical dimensions of which are 12" x 18" x 5/8". The body 2 has a smooth, planar outer or front surface 3, bevelled sides 5 and 6, and a rough, planar inner
25 or rear surface 7. A flange 9 extends around the rear or inner periphery of the panel. A pair of hangers 10 are

embedded in the rear surface 7 of the panel. The hangers 10 are used to mount the panels 1 on plywood backing strips (not shown) when finishing a wall. Grout is provided between the panels to complete the exterior of the wall.

5 As shown in Figs. 4 to 8, each hanger 10 includes an elongated, galvanized metal body 12 defining a central channel 13 with a generally U-shaped cross section extending substantially the entire length of the hanger, and a pair of flanges 14 integral with and extending outwardly from the
10 edges of the channel 13. A locating hole 16 (Figs. 5 and 6) is provided in one end of the body 12, and a pair of diverging spring arms 17 are provided on the other end of the body. The arms 17 are extensions of the flanges 14. Diagonal slits are cut in the flanges 14 near each end thereof, and the thus
15 formed prongs 18 are bent at approximately 90° to the flanges 14 for anchoring the hanger 10 in the concrete body 2 of the panel 1.

Referring to Figs. 9 to 12, panels 1 are produced using a form and a transfer dispenser generally indicated at
20 20 and 21, respectively. The form 20 is defined by a thin, molded, polystyrene sheet 22, which includes a plurality of cavities 24 for receiving concrete. A flat ledge 25 is provided around the top periphery of each cavity 24. Pairs of plastic dowels 27 are mounted in the ledge 25 on opposite
25 sides of each cavity. The dowels 27 are intended to support the ends of the hangers 10 (Fig. 11).

As best shown in Fig. 10, each dowel 27 includes a slightly downwardly tapering body 28 with a frusto-pyramidal block 30 on one side of the top thereof and a narrow diameter pin or post 31 extending upwardly from a tapering plate 32 on the other side of the top. In order to be able to stack forms, the diameter of the base of the body 28 should be as large as possible. In use, the body 28 is placed in a hole 34 (Fig. 12) in the ledge 25.

The dispenser 21 is used to transfer concrete from a source thereof to the cavities 24 in the form 20. The dispenser 21 is defined by a rectangular plate 35 with a plurality of rows of rectangular openings 37 therein. Downwardly tapering spouts 38 are provided on the bottom of the plate 35 around the openings 37.

In order to produce panels 1 of the type shown in Figs. 1 to 3, hangers 10 are placed over each cavity 24 in the form 20. The hangers 10 can be placed on the form 20 at any time prior to casting, and stored in this manner. As best shown in Fig. 11, the hangers 10 overlap the dowels 27, and the hangers an adjacent cavities 24 are aligned end-to-end. Thus, the post 31 of one dowel 27 enters a hole 16 in one end of one hanger 10, and the arms 17 of the next hanger 10 straddle the block 30 to retain the hangers in position during casting. When the hanger 10 is on the post 31, the channel 13 straddles the plate 32. The form 20 with the hangers 10 thereon is placed on a vibrating table (not shown), which

should be as clean as possible to avoid damage to the form by hard particles.

5 With the dispenser 21 on a vibrating table, concrete is poured into the spouts 38 to fill the latter. The total volume of the spouts 38 in the dispenser 21 is roughly equal to the volume of one cavity 24. By vibrating the dispenser 21, the spouts 38 are filled, and a rubber squeegee is used to manually remove excess concrete from the top of the dispenser. Once the vibrator is stopped, the viscosity of the concrete
10 increases rapidly so that the concrete remains in the spouts 38 even though the latter have open bottom ends. The dispenser 21 is lifted from the vibrator table in a sliding lifting motion so that no concrete is sucked from the spouts 38 (as would happen if the dispenser is lifted vertically).

15 The dispenser 21 is placed on the form 20 where it is supported by the dowels 27. The form vibrator is actuated to cause the concrete to flow into the cavity 24. The length of the vibration cycle depends on the slump or workability of the concrete. Vibration of the form 20 eliminates air pockets
20 in the concrete, evenly distributes concrete in the form and firmly embeds the hangers 10 in the concrete. Upon completion of the form vibration step, the concrete is allowed to cure, completing a panel.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A method of producing a concrete building panel of the type including a thin concrete body and metal hangers embedded in the body for mounting the panel, said method comprising the steps of:

- (a) placing hangers for the panel on a form;
- (b) loading a transfer dispenser with sufficient concrete to fill the form;
- (c) placing the transfer dispenser over the form;
- (d) vibrating the transfer dispenser to release the concrete into the form; and
- (e) vibrating the form to settle the concrete in the form.

2. A method according to claim 1, wherein the transfer dispenser is placed on the form prior to vibration of the dispenser; and the transfer dispenser and form are vibrated simultaneously.

3. An apparatus for producing a concrete building panel of the type including a thin, concrete body and metal hangers embedded in the body for mounting the panel, said apparatus comprising:

- (a) thin plastic form means defining a cavity including bottom wall means, side wall means and an open top for receiving concrete;

(b) dowel means on said side wall means for supporting said metal hangers in the open top of the form;

(c) transfer dispenser means for receiving and dispensing a predetermined volume of concrete into said form means; and

(d) vibrator means for vibrating said transfer dispenser means to cause concrete to flow from the dispenser means into the cavity of said form means, and for vibrating said form means to distribute concrete even in the cavity and to eliminate air pockets in the concrete.

4. An apparatus according to claim 3, wherein said form means includes a plurality of identical cavities; and ledges separating said cavities for carrying said dowel means.

5. An apparatus according to claim 4, wherein each hanger includes an elongated metal body with an opening in one end and a pair of arms flaring outwardly from the other end thereof, said dowel means including downwardly tapering body means for mounting the dowel means in a hole in a form means ledge; post means on said body means for insertion into the opening in said one end of the said body means; and block means on said body means for straddling by the arms of the hanger, whereby each hanger is securely mounted on the form means during panel production.

6. An apparatus according to claim 3, wherein said transfer dispenser means includes plate means; and a plurality

of open ended spout means extending downwardly from said plate means for receiving and dispensing concrete into said form means.

7. An apparatus according to claim 6, wherein the total volume of said spout means is approximately equal to the volume of a cavity in said form means.

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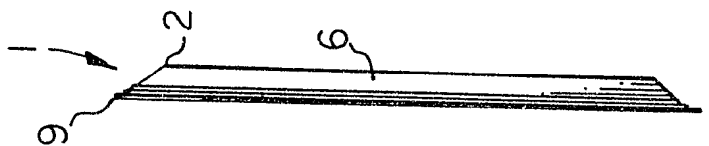


FIG. 2

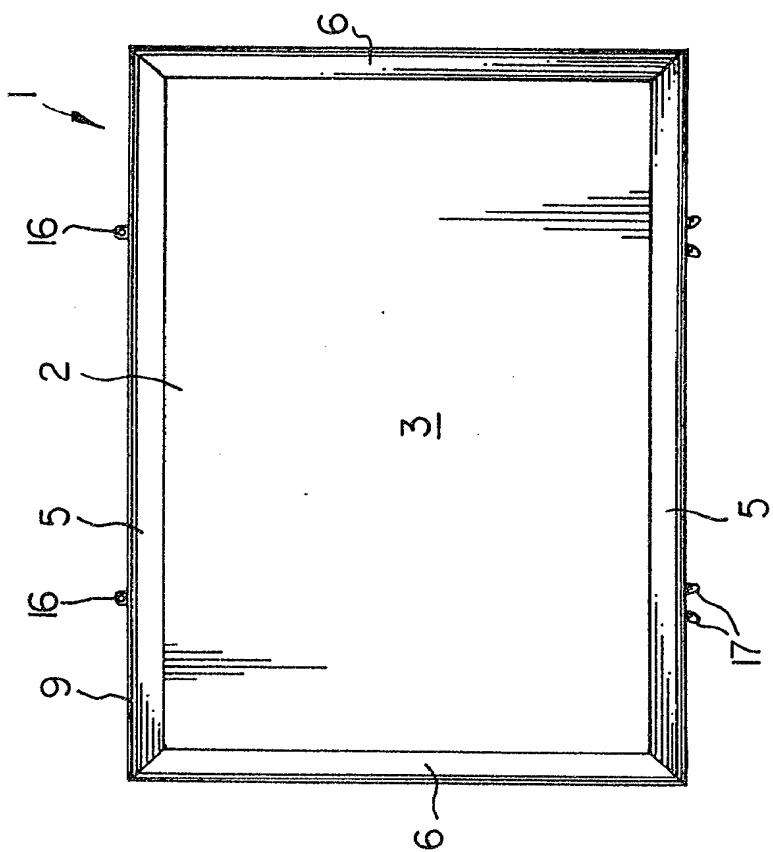


FIG. 1

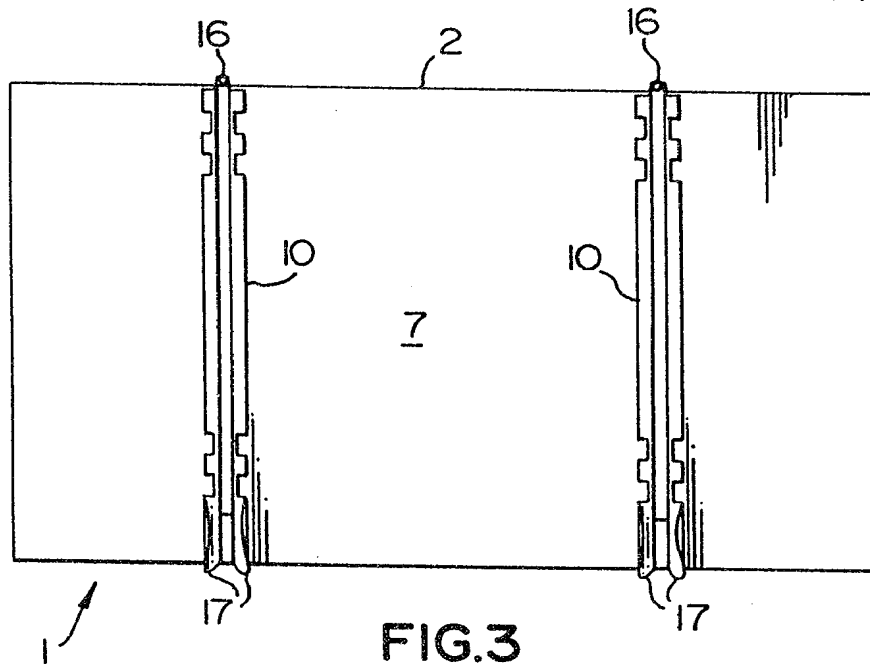


FIG. 3

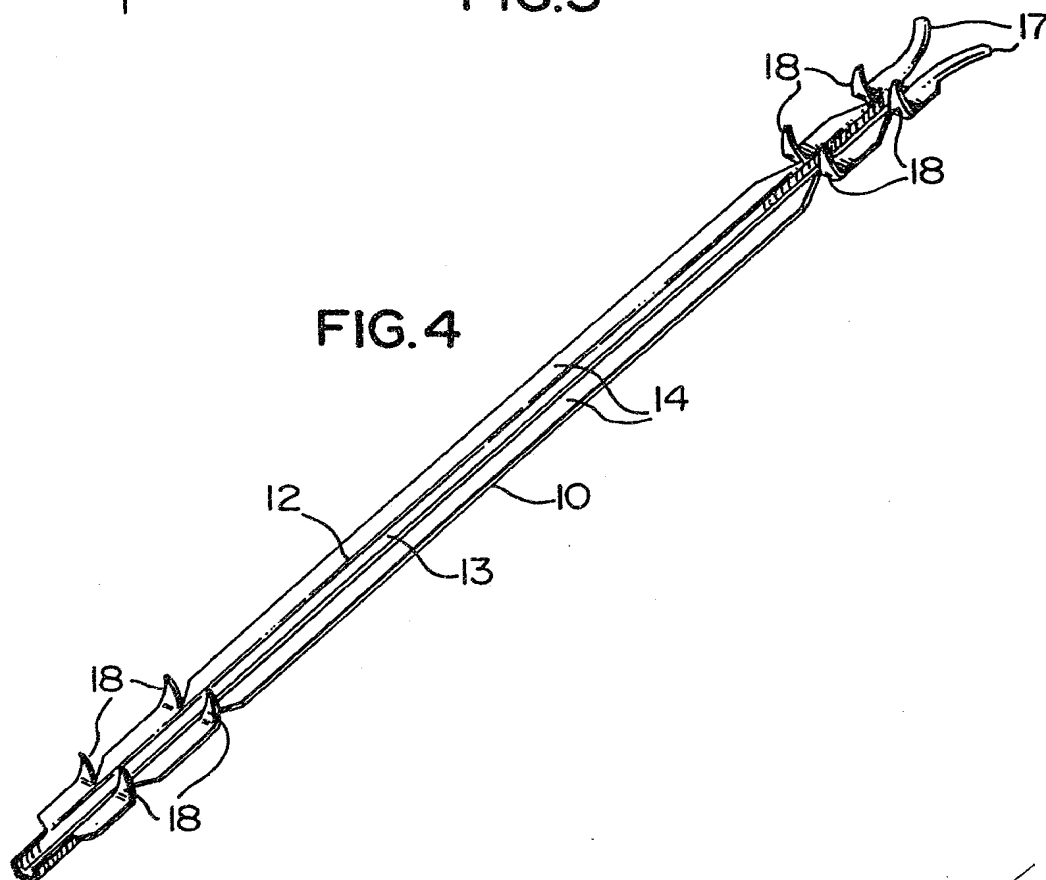


FIG. 4

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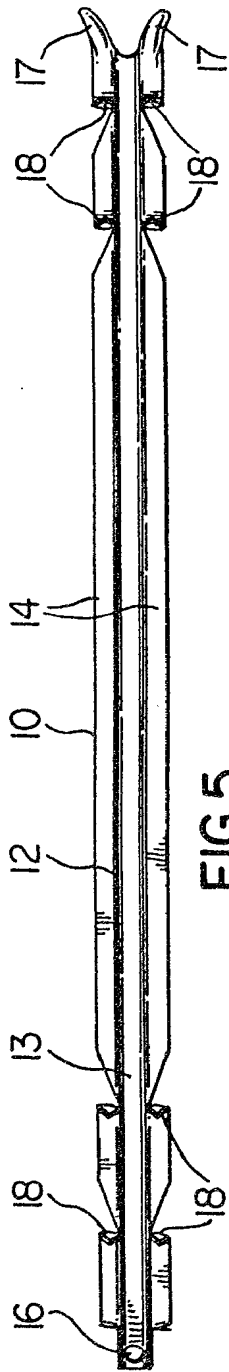


FIG. 5

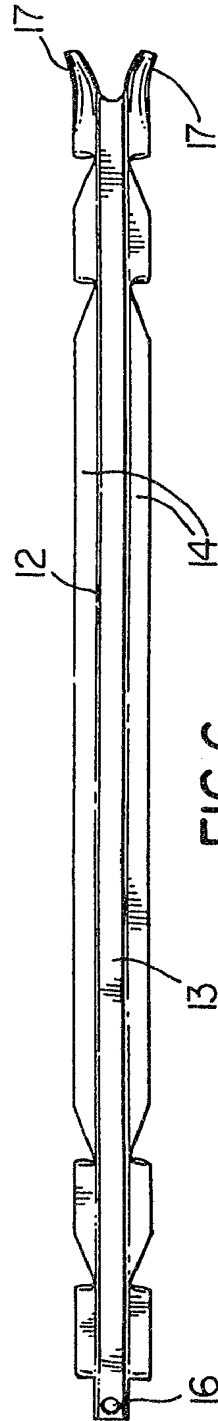


FIG. 6

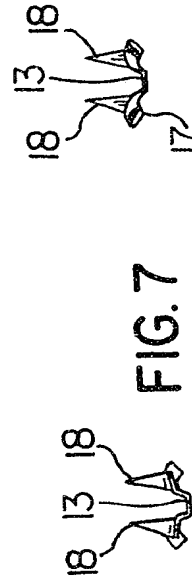


FIG. 7

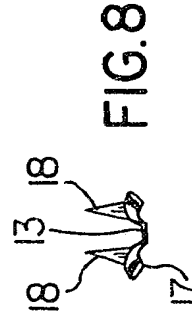
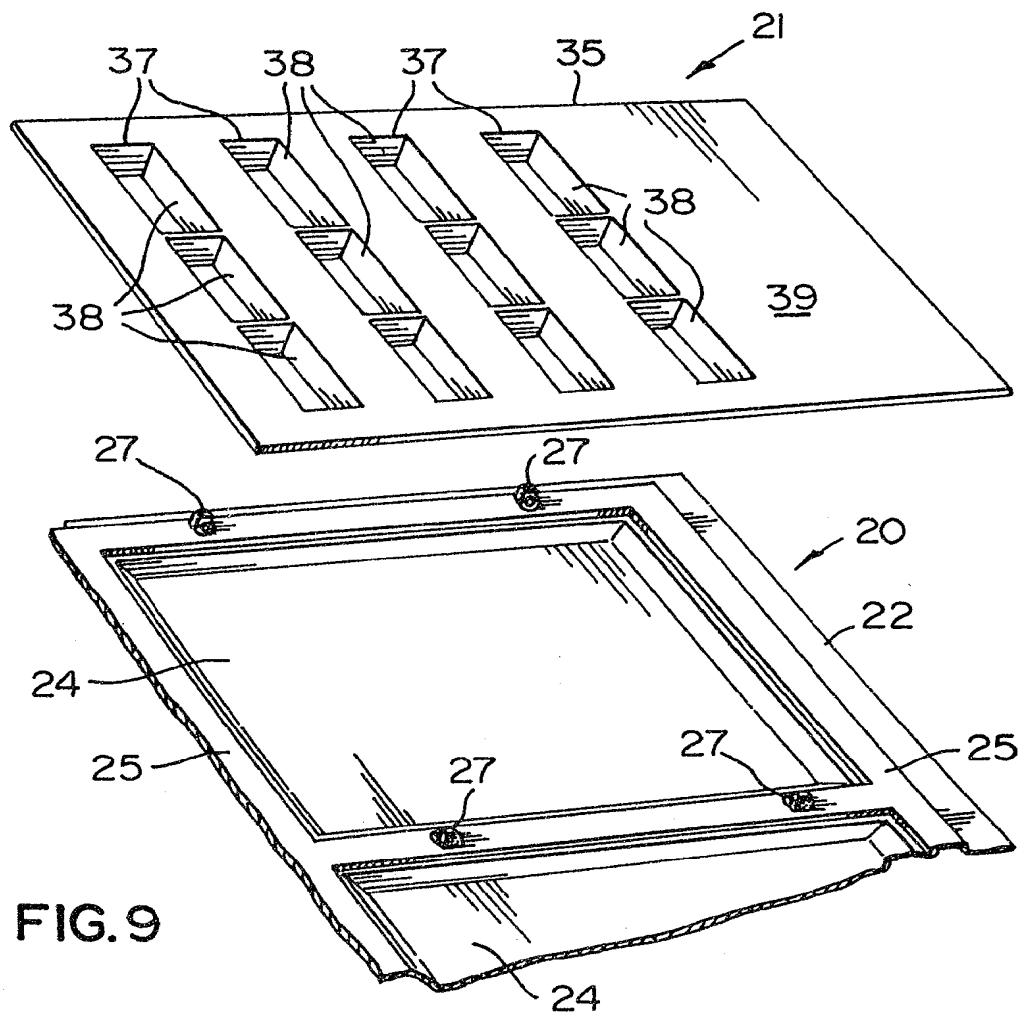


FIG. 8

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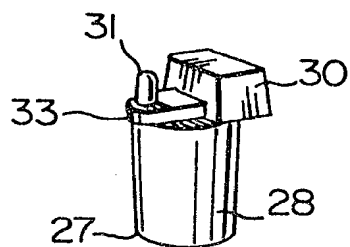


FIG. 10

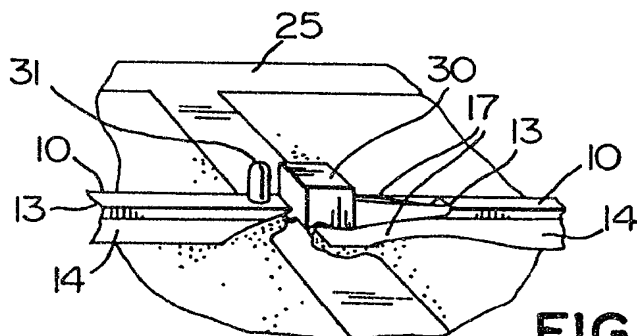


FIG. 11

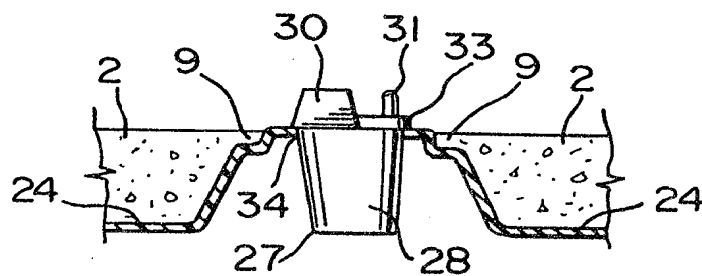


FIG. 12

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